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Extra Earning Power: The Financial Returns to University Education in Canada

By

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- By investing in an undergraduate degree, male students will see an annual return, in after-tax earnings, of roughly 12 cents per dollar and female students 14 cents per dollar – well above the returns for other forms of investment.
- Because the economic returns from university education are high, society can also expect to see an annual return of 9 cents for every dollar invested in undergraduate university education.
- Such strong social and individual returns from the pursuit of university education should figure prominently in policymaking, and in student choices.

Acquiring a university degree offers substantial financial returns to students; for women more so than men and for undergraduate degrees more so than advanced degrees. The expected returns to education also signal labour demand in particular fields, which is helpful for policymakers who distribute funds and for students who must choose their specialty.

Obtaining a university degree is partly an investment decision, whereby an individual decides to seek a particular set of credentials: The acquisition has financial costs that are connected to future benefits. However, an individual's decision also has an impact on society. Governments, acting on behalf of the society, may decide to bear some of the costs to improve access to university schooling in expectation of future benefits, such as increased employment earnings and tax contributions by better-qualified workers.

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Table 1: Monetary Costs and Benefits of Acquiring a Degree

	Benefits	Costs
Private IRR	Effect on after-tax earnings of individuals acquiring degree, compared to after-tax earnings of those at previous education level.	Tuition fees, foregone after-tax earnings during studies, expenses for books and furniture.
Social IRR	Effect on pre-tax earnings of individuals acquiring degree, compared to pre-tax earnings of those at previous education level.	Total costs of education as measured by university spending (includes federal and provincial subsidies), foregone pre-tax earnings during studies, expenses for books and furniture.

Whether it is considered from the individual's perspective or from society's perspective, there is a discount (interest) rate, an internal rate of return (IRR), which balances the monetary benefits and costs of an investment over time. The private IRR and social IRR tell us the financial payoff associated with additional levels of education. This *e-brief* presents results on the IRRs for university education in Canada for 2000.[1]

Calculating Internal Rates of Returns

The information used to calculate IRR is summarized in Table 1. Although monetary considerations may not be the sole factor considered when deciding to pursue a university education, private IRR may be especially useful for the prospective student facing tight financial constraints or a long-time commitment to obtain a university degree. Social IRR, on the other hand, may be used by policymakers as a guide in the allocation of scarce public resources to specific levels and fields of education. Social IRR represents the value of obtaining a university degree to society, in terms of the stream of earnings related benefits individuals would provide over and above education costs. Low social IRR, for example, may suggest high costs of education or an oversupply of a certain type of worker skill sets in the economy. In contrast, high social IRR may signal high demand for, or even shortages of, certain skills.

We use the 2001 Census data to estimate earnings profiles by the highest level of schooling attained, by sex, and by age. We calculate earnings profiles in constant 2000 dollars, removing the effects of inflation. Data on taxes, tuition fees and teaching costs come from Statistics Canada, provincial government documents, and other sources.[2]

1 These results update those for 1990 and 1995 found in Vaillancourt and Bourdeau-Primeau (2002) and complement the work of Collins and Davies (2005).

2 Moussaly-Sergieh (2005). See also Vaillancourt and Bourdeau-Primeau (2002) for details on similar assumptions and methodology.

Table 2: Private and Social Rates of Return, University Graduates, by Sex, Type of Degree, and Fields of Study for Undergraduates, Canada, 2000

	Private Rates (%)		Social Rates (%)	
	Men	Women	Men	Women
Type of Degree				
Undergraduate	11.5	14.1	8.6	9.2
Masters	2.9	5.0	<0	2.1
PhD	<0	3.6	<0	4.1
Medicine	21.4	21.6	7.8	6.0
Undergraduate by Field of Study				
Education	9.0	14.0	8.2	11.9
Humanities	<0	9.5	<0	7.8
Social sciences (includes law)	10.8	14.0	10.2	11.9
Commerce	9.0	19.3	8.2	16.4
Biological sciences	9.0	7.6	4.7	2.7
Engineering	9.0	14.2	4.7	5.9
Health Sciences	18.1	17.7	9.7	7.6
Pure Sciences	9.0	14.0	4.9	7.6

Source: Moussaly-Sergieh, 2005, table 16.

High Private and Social Returns

Overall, university postsecondary education investments yield high ex post rates of return, according to earnings profiles for degree holders in the year 2000 (Table 2).[3] We find private rates of return to undergraduate degrees to be around 12 percent for males and 14 percent for females, annually. Rates of return also vary across fields of study: private rates of return are the lowest for humanities and the highest for health sciences. Master's degrees and PhDs offer lower returns than undergraduate degrees.

Private and social IRRs for undergraduate degrees are higher for females than for males. Since we assume tuition fees and expenses on books and furniture to be the same for males and females, the differing results are due to another factor – differences in earnings profiles. Earnings profiles of males are higher than those for females for a given level of education attained (either high-school or undergraduate degrees). Moreover, the difference in earning profiles between males and females is relatively smaller for bachelor's degree holders than for high-school diploma holders.[4] Hence, foregone earnings represent a lower cost for females than for males when studying for the next degree.

The decline in private rates of return from 1990 to 2000 (see figures 1a, 1b)[5] may be explained in part by an increase in tuition fees by a Canada-wide average of 235 percent (from $1,464 in 1990/91 to $3,447 in 2000/01) that far outpaced a 23 percent increase in average weekly wages (from $541 in 1990/91 to $663 in 2000/01).[6] Another factor at play is a trend toward increases in personal income taxes over the period, which reflected the lack of indexing for inflation and the use of personal income surtaxes applicable to higher earners.

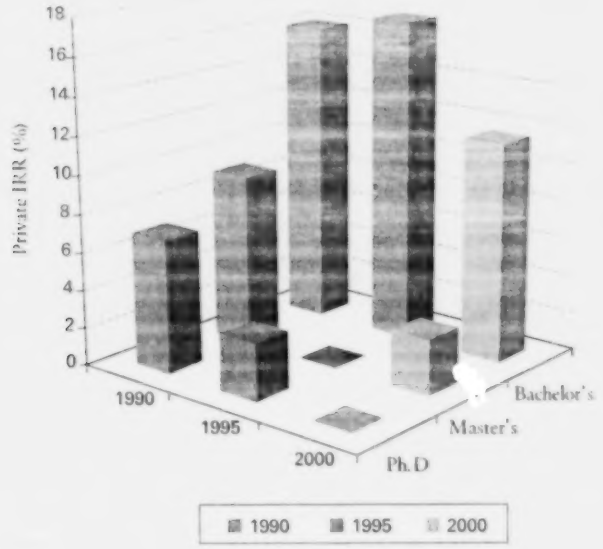
3 While results for 2000 may seem outdated, they are the latest given the availability of data for Canada. Ensuring timely data are publicly available, however, remains a notable challenge. See Vaillancourt and Bourdeau-Primeau (2002) for 1995 figures.

4 Moussaly-Sergieh (2005).

5 Which is similar to the findings of Collins and Davies (2005, Table 1, p.3) for the 1990-to-1998 period.

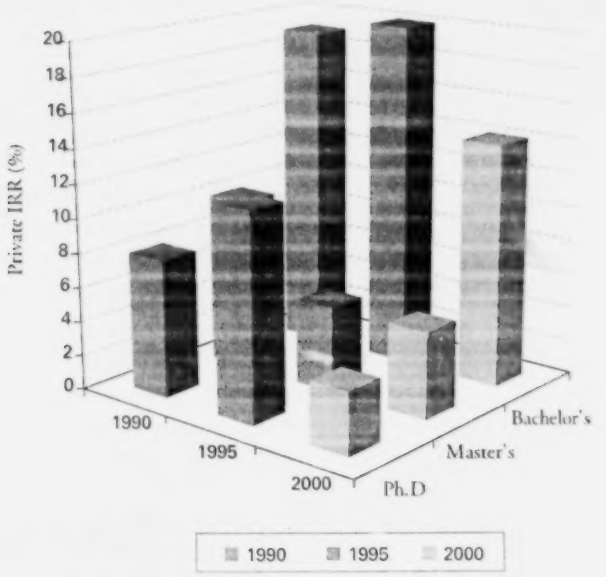
6 Average wage data is from CANSIM Table 281-0026.

Figure 1a: Private Rates of Return for Males, Canada, 1990, 1995 and 2000



Sources: Vaillancourt and Bourdeau-Primeau (2002), Moussaly-Sergieh (2005).

Figure 1b: Private Rates of Return for Females, Canada, 1990, 1995 and 2000



Sources: Vaillancourt and Bourdeau-Primeau (2002), Moussaly-Sergieh (2005).

Table 3: Social Rates of Return, University Graduates, by Sex, Type of Degree, Canada, 1990, 1995 and 2000

	Males			Females		
	Bachelor's	Master's	PhD	Bachelor's	Master's	PhD
1990	8	4	1	8	4	-2
1995	10	0	-2	10	0	2
2000	9	0	0	9	2	4

Sources: Vaillancourt and Bourdeau-Primeau (2002), Moussaly-Sergieh (2005).

The social rates of return associated with undergraduate degrees, in contrast to private rates of return, do not drop from 1990 to 2000 (Table 3), perhaps because they do not explicitly account for personal income taxes and fees.

Implications for Decisionmakers

Because private IRRs presented in Table 2 are real net-of-tax rates of return, this means that, assuming a combined federal and provincial personal income tax rate of 40 percent, the pre-tax rates of return of undergraduate degrees are about 20 percent for men and 25 percent for women.[7] This is substantially higher than the pre-tax rate of returns available on long-term financial instruments[8] – the alternative investments that could be made with the money spent on acquiring a university degree. That said, private IRRs are not high in all fields. Hence, policymakers should make sure that appropriate and timely information is available to prospective students on educational outcomes so that the student could include this information with other non-monetary factors in his or her decision.

Governments should take into account social IRRs when setting tuition-fee policies and regulations, which determine the share of the costs of education that students have to bear. Subsidizing a higher share of the costs of education in fields of study associated with low social IRRs may encourage over-investment in certain types of human capital.

In deciding the appropriate fees, policymakers should also consider that highly educated Canadians are more mobile.[9] They own a valuable asset, a learned skill-set, which they can take with them when they migrate, and may leave Canada without having necessarily paid an appropriate price for that asset. Therefore, were governments to bear a high share of the education costs in fields associated with high social IRRs, it would not necessarily generate the expected benefits for society.

7 In 2000, the lowest federal personal income tax rate was 16 percent and the highest was 29 percent. Holders of university degrees would, given their income level, face a tax rate of at least 22 percent at the federal level and thus a combined federal/provincial rate of about 33 percent; more likely, they would face a 26 percent federal rate and a combined federal provincial rate in the order of 40 percent. We report approximate gross rates of returns for a 40 percent combined tax rate.

8 In January 2000, the gross (before tax) average yield on long-term Canadian government bonds was 6.36 percent (Selected historical interest rates, Bank of Canada, p. 22), while the rate on provincial long-term bonds was 6.78 percent (p. 28) and on corporate long term bonds 7.31 percent (p. 29) at http://www.bankofcanada.ca/en/rates/scl_hist.html.

9 See Finnie (2001).

Finally, decisionmakers should distinguish between undergraduate and graduate fees to take into account differences in the private IRRs and the impact of externalities on society in the funding of university studies.

Given the important role that provincial governments play in financing universities in Canada and the absence of well-established private universities such as exist in the United States, provincial governments strongly influence the quality and availability of university education. They set both the subsidy levels and the student fee policies for post-secondary institutions.

In view of the increasing importance of a highly qualified workforce in the success of nations in the world, our governments should establish a baseline level of funding for university schooling. This level of subsidy could match roughly the public returns to education. University fees, while accompanied by financial aid mechanisms, should be set by the educational institutions so as to finance any remaining gaps between the production costs of, and subsidies to, universities.

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